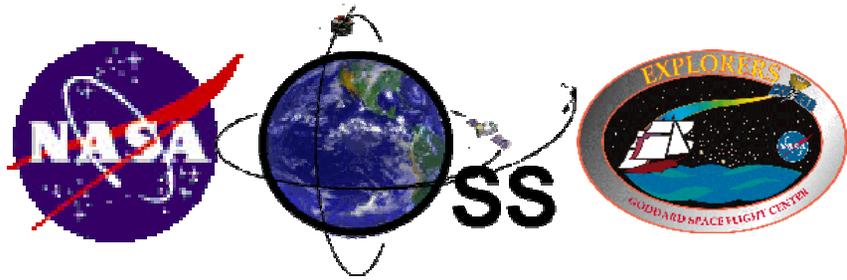


**MIDEX 2001 PrePropConf**  
**TMC Review and Evaluation Process**

# **TMC Review and Evaluation Process**

**Brad Perry, Explorer Acquisition Manager**

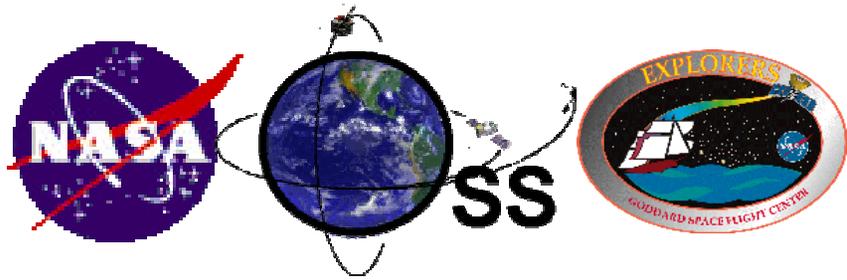
- TMC Principles
- TMC Process
- TMC Evaluation Objective
- TMC Technical Definitions
- Considerations for Mission Investigations
- Cost Estimate
- Some Characteristics Applicable to a Low Risk Rating
- Typical TMC Evaluation Questions for Mission Investigations



## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### TMC Principles

- **All Proposals will be reviewed to identical standards.**
  - Evaluation Plan approved by NASA HQ and in place before Proposals arrive.
  - All Proposals receive same evaluation treatment in all areas and by all reviewers.
  - The TMC process is used by ESSSO to support all OSS evaluations with a standard process.
- **All evaluators are peers in the area of expertise that they evaluate.**
- **Basic Assumption: Proposer is the expert on his/her Proposal.**
  - **TMC:** Task is to try to validate Proposer's assertion of Low Risk.
  - **Proposer:** Task is to provide evidence that the project is Low Risk.

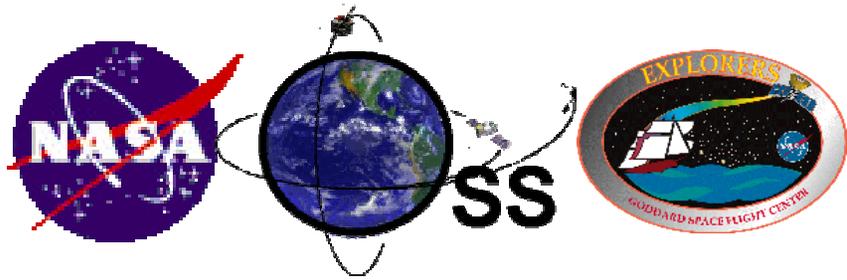


## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### TMC Process

#### **TMC Evaluators are:**

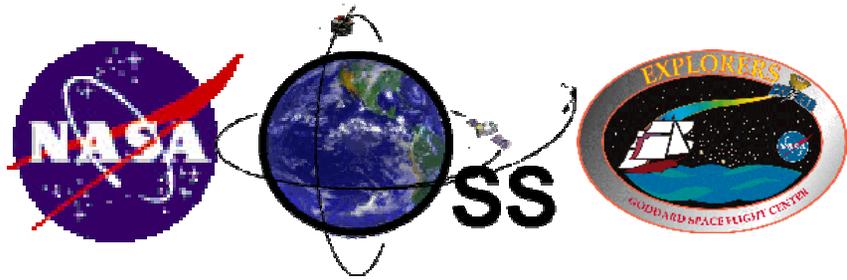
- Best (non-conflicted) CS, DOD, contractor, consultant, and other Government personnel available to support the review.
  - Peers in the areas of expertise they evaluate.
  - Specialists review all Proposals for a particular area of specialty and provide findings, but do not participate in final ratings (instruments, cost, etc.).
- 
- **TMC Findings are the consensus of the entire TMC Panel.**
    - Findings are defined as either expected (no finding), above expectations (strengths), or below expectations (weaknesses).
    - Findings result in a Risk Rating (Low, Medium, or High).



## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### TMC Evaluation Objective

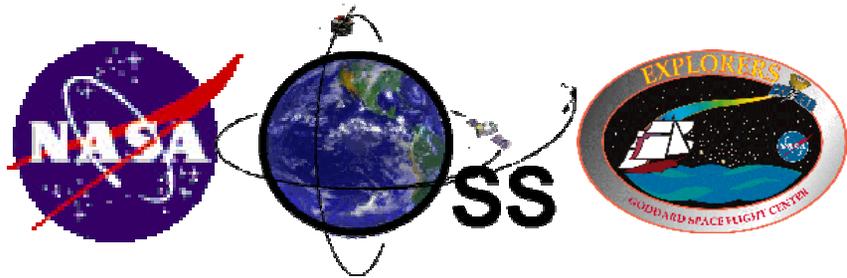
- The TMC evaluation is to determine, for each Proposal, the level of risk of accomplishing the scientific objectives of the mission, as proposed, on time and within cost.
- Three bands of risk are defined: **Low Risk, Medium Risk, and High Risk.**
- Exactly what constitutes Low, Medium, or High Risk is a complex issue; however, the following general definitions apply:
  - **Low Risk:** No problems exist that cannot be normally overcome within the time and cost proposed. “Envelope adequate”
  - **Medium Risk:** Problems exist, but are not sufficiently bad such that they cannot be overcome with good management and engineering. “Envelope tight”
  - **High Risk:** Major problems and insufficient resources exist to overcome the problems. “Does not fit within the Envelope”



## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### TMC Technical Definitions

- **Envelope:** Resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, and data; descope options; and fallback plans.
- **Contingency (or Reserve):** When added to a resource, results in the maximum expected value for that resource. Percent contingency is the proposed value of the contingency divided by the maximum expected value of the resource minus the contingency.
- **Margin:** The difference between the maximum possible value of a resource (the physical limit or the agreed-to limit) and the maximum expected value for a resource. Percent margin for a resource is the margin divided by the maximum possible value minus the margin.



## **MIDEX 2001 PrePropConf TMC Review and Evaluation Process**

### **Considerations for Mission Investigations**

Generally, the degree to which Proposals address the following factors directly relate to the grade of Low, Medium, or High Risk:

#### **Spacecraft**

Depth of Detail  
Simplicity vs. Complexity  
New Technology  
Design Life/Reliability

Margins  
Heritage/Maturity  
Redundancy

#### **Instruments**

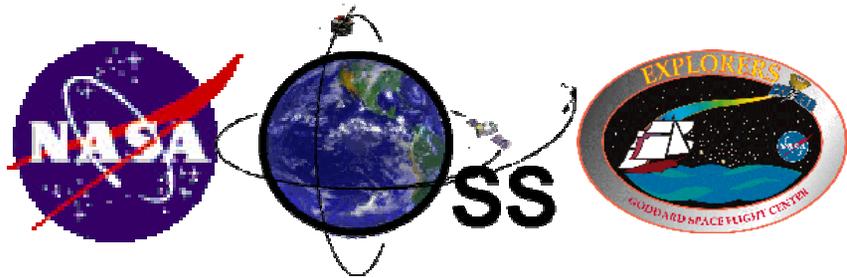
Requirements/Interface  
Complexity/Difficulty  
Depth of Detail

Heritage/Maturity  
Operations

#### **Mission Design**

Depth of Detail  
Difficulty/Complexity/Flexibility

Launch Vehicle



# MIDEX 2001 PrePropConf

## TMC Review and Evaluation Process

### Considerations for Mission Investigations (continued)

#### Mission Ops/GDS/Communications

Facilities (Including Ground Stations)  
 Complexity  
 Depth of Detail

Communications Margins  
 Team Experience and Roles

#### Systems Engineering

Depth of Detail  
 Complexity  
 Quality Assurance

Trades  
 Integration and Testing

#### Management/Organization/Structure

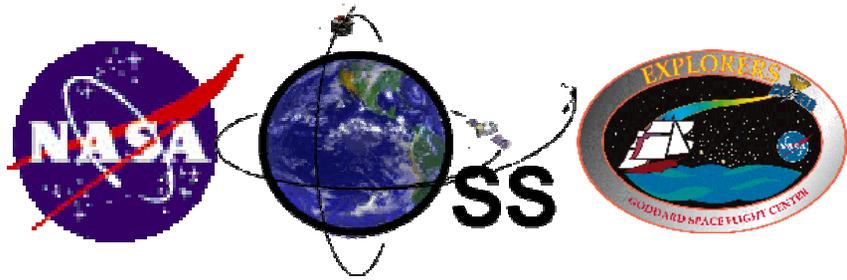
Structure and Teaming  
 Detailed Description (Including SOW)  
 Maturity

PI/PM Defined Roles  
 Experience (Org/Key Person)  
 Commitment

#### Risk Management

Risk Understanding and Assessment  
 Reserves and Margins

Technology Risk Mitigation  
 Descope Plan



## **MIDEX 2001 PrePropConf TMC Review and Evaluation Process**

### **Considerations for Mission Investigations (concluded)**

#### **Cost and Schedule**

Cost Basis: Grassroots and Models

Variety of Techniques

Costs vs. Tasks vs. Organizations vs. Schedule

Cost Reserves and Management

Cost Savings and Heritage

Cost Envelope

Risks, Threats, Mitigation Levels

Cost Caps - Cap vs. 20% Growth Capability

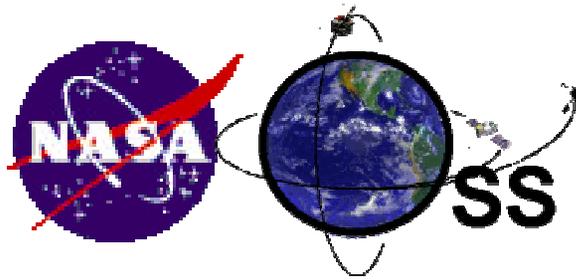
Technical Maturity vs. Cost Estimate

Technical Complexity vs. Cost Estimate

Past Experience of Meeting Cost and Schedule

Schedule vs. Tasks

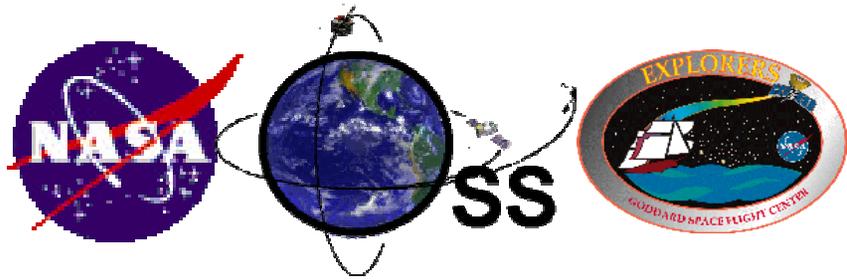
Schedule Contingency and Reserve (Funded and Unfunded)



## **MIDEX 2001 PrePropConf TMC Review and Evaluation Process**

### **Cost Evaluation**

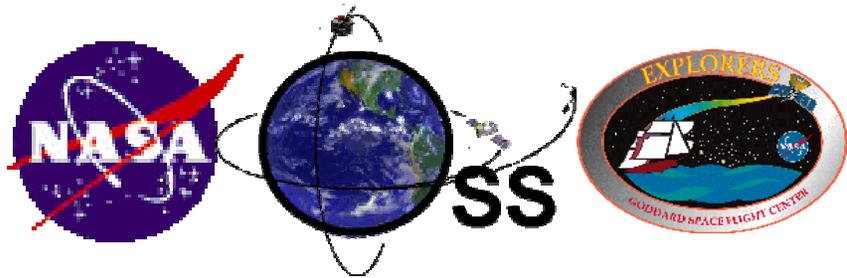
- Cost Realism is evaluated; however, a “should cost” or “Government estimate” is not reported.
- Cost Realism: Reported as Cost Risk (Low, Medium, High); based on Models, Analogies, Heritage, and Grass Roots information from Proposals. Everyone is responsible for Cost Realism evaluation, not just Cost Team.
- Initial cost analysis based on Proposals (consistency checks, completeness, basis of estimate, contributions, full cost accounting, reserve levels and management, etc.).
- Several independent cost models used to support cost analysis.
- Cost threats, risks, and risk mitigation analysis developed and discussed.
- All information from the entire Evaluation Process provides final assessment



## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### Some Characteristics Applicable to a Low Risk Rating

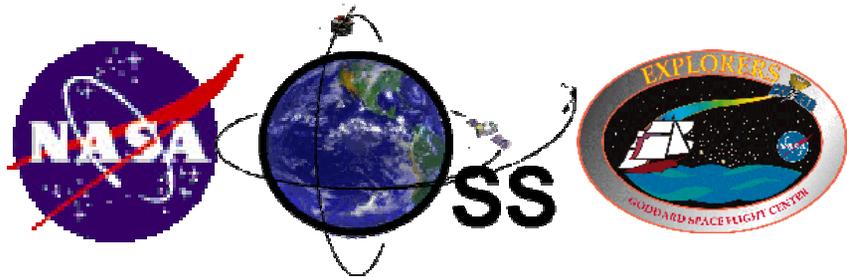
- All risks for the project have been/are being identified and managed by the team, with plans to reduce or retire the risk before launch.
- No risk exists for which there is neither a workaround planned, nor a very sound plan to develop and qualify the risk item for flight.
- The proposed project team and each of its critical participants are competent, qualified, and committed to execute the project.
- The project will be self-managed to a successful conclusion while providing reasonable visibility to NASA for oversight.
- The team has thoroughly analyzed all project requirements, and the resulting resources proposed are adequate to cover the projected needs, including an additional percentage for growth during the design and development, and then a margin on top of that for unforeseen difficulties.
- Reserve time exists in the schedule to find and fix problems if things do not go according to plan.
- Any contributed assets for the project are backed by letters of commitment.
- The team understands the seriousness of failing to meet technical, schedule, or cost commitments for the project in today's environment.



## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### Typical TMC Evaluation Questions for Mission Investigations

- Will overall mission/project design (spacecraft, launch vehicle, ground system, mission ops) allow successful implementation of mission as proposed? If not, are there sufficient resources (time & \$) to correct identified problems?
- Does proposed design/development allow the mission to have a reasonable probability of accomplishing its objectives and include all needed tools? Does it depend on new technology that has not yet been demonstrated? Are requirements within existing capabilities or are advances required? Does the Proposal accommodate sufficient resiliency in appropriate resources (e.g., money, mass, power) to accommodate development uncertainties?
- Is there a Risk Management approach adequate to identify problems with sufficient warning to allow for mitigation without impacting the mission objectives? Does Proposer understand their known risks and are there adequate fallback plans to mitigate them, including risk of using new technology, to assure that the mission can be completed as proposed?



## MIDEX 2001 PrePropConf TMC Review and Evaluation Process

### Typical TMC Evaluation Questions for Mission Investigations (concluded)

- Is the schedule doable? Does it reveal an understanding of the work to be done and the time it takes to do it? Is there a reasonable probability of launching on time? Does it include schedule margin?
- Will proposed management approach (e.g., institutions and personnel, as known, organization, roles and responsibilities, experience, commitment, performance measurement tools, decision process, etc.) allow successful completion of the mission? Is the PI in charge?
- Does the mission, as proposed, have a reasonable chance of being accomplished within proposed cost? Are proposed costs within appropriate caps and does cost estimate cover all costs including full cost accounting for NASA Centers? Are costs phased reasonably? Is there evidence in the Proposal to give confidence in the proposed cost? Does the Proposer recognize all potential risks/threats for additional costs or cost growth (e.g., added costs of utilizing the Space Shuttle, failed developments, etc.)?